Churchill Park Reforestation Project Summary 2009 - 2023

Volunteers Planting Shrubs
Photo Credit: Mallory Peirce

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Document Description

This report from the Ecological Stewardship Department of Royal Botanical Gardens has been reviewed internally. Its contents have not yet been subject to an independent peer review. It is authorized for release by Royal Botanical Gardens subject to acknowledgment that it is being provided for information purposes only, and that its contents may be subject to revision following independent review. It reflects Royal Botanical Gardens' efforts to reestablish a forest buffer and recreate an interior forest area on the south side of Cootes Paradise adjacent to Churchill Park. This work is independent of the City of Hamilton's within the park tree planting program. References to other agencies, organizations, or officials do not constitute endorsement of this report by those or any other agency.

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Executive Summary

Churchill Park and the adjacent forest, located on the south shore of Cootes Paradise is part of the original properties at Royal Botanical Gardens (1941). Protection and more recent restoration to stop decline of the fragmented Old Growth Carolinian Forest in this area has been a focal activity for more than a decade. This has included both the transformation of the park and establishment of an edge reforested buffer area. The park transformation is a collaborative project with the City of Hamilton.

Since 2009, RBG set goals the following goals for the adjacent forest:

1) Reduce the amount of forest edge exposed to the park.

2) Increase forest cover (thereby increasing forest interior habitat).

3) Improve the health and ecological integrity of the forest by removing invasive species along the edge and reducing forest disturbance by controlling trail access around the perimeter of the park.

Starting in 2011, and finalized in 2015, the City of Hamilton worked with RBG to complete the Churchill Park Master Plan with a community goal to "*Preserve our existing open space and encourage adaptable, inviting, safe, beautiful, and sustainable environment that reflects the community's values, provides a community gathering space, and facilitates participation in activities for everyone."* Through the Master Plan, the City and RBG addressed issues of the parks' standing water and infiltration, user accessibility, and forest decline that impacted the environmental sustainability of the park and surrounding forest. A key aspect of the reforestation project was establishing both water management and a four-season trail system.

Between 2009 and 2023, three hectares of forest edge (7.4 acres – 2km length) surrounding Churchill Park, and adjacent to the Teaching Garden, had over 11,000 native trees and shrubs planted (approximately 60 native site-appropriate species). This was dominated by Gray Dogwood (*Cornus racemosa*) to create an outer edge thicket, also protected by an edge fence. Entrances to the forest's nature trails were concentrated to five from over ten, most of which were ad hoc cuts into the forest. Developing a 2.2 km accessible path that winds through the park, assisted with the decommissioning of the unofficial trail entrances. The reforested areas act as a buffer between the urban environment and the Carolinian forest, helping to reduce forest disturbance and protect interior forest habitat. In addition, one large area of park was reforested to reduce the 1.5km long winding edge and build out the physical space for interior forest habitat.

Follow up site management after project completion will continue as needed. This includes fencing repairs and removals, invasive species management, re-planting as necessary pending survivorship of the plantings, and addressing water pooling and drainage issues.

Introduction

Location and Designations

Churchill Park is an urban park located in the Westdale neighbourhood of Hamilton and is located on land owned by Royal Botanical Gardens (hereafter referred to as RBG). This land lies within the Niagara Escarpment UNESCO World Biosphere Reserve and the Niagara Parks and Open Space System (NEPOSS). The park is operated by the City of Hamilton as a developed, recreational park, and is operated in parallel with the adjacent Teaching Garden/Aviary totaling 19.12 hectares (equivalent to 47.24 acres).

The park, created from and old clay quarry, consists of multi-use sports fields and recreational structures and occupies approximately 14.56 hectares (35.98 acres). This section of land is surrounded by Cootes Paradise Nature Sanctuary, Parkside Drive, Parkview Drive, and Cline Avenue. The second, smaller parcel of land occupies 4.56 hectares (11.27 acres) and is formerly known as RBG's "Teaching Gardens". This area abuts Oak Knoll Drive, as well as the Cootes Paradise Nature Sanctuary. This area of land is used by the Hamilton Aviary, as well as a community garden, and passive park uses.

Churchill Park is situated within the NEC's Development Control Area and is designated as an "Urban Area" in the Niagara Escarpment Plan. The Cootes Paradise Sanctuary is designated as "Escarpment Natural Area" within the NEP. In the NEPOSS, Churchill Park is incorporated within the larger realm of RBG's Nature Sanctuaries, which is classified as a "Natural Environment" park in the System for its ecologically significant natural features, landscapes, and historical resources.

RBG is also designated as the following:

- National Historic Site
- Nature Sanctuary
- IBA (Nationally Important Bird Area)
- IMPARA (Important Reptile and Amphibian Area)
- ANSI (Provincially Significant Area of Natural and Scientific Interest)
- PWA (Provincially Significant Wetland)
- ESA (Municipal Environmentally Significant Area)
- Partner within the Cootes to Escarpment EcoPark System

Site History

Archaeological investigations have shown that the land south of what is now referred to as Cootes Paradise Marsh at the western tip of Lake Ontario has been inhabited by many Indigenous nations over the course of history. In the early 1600s, when the first French explorers visited the area, then occupied by Indigenous peoples known as the Neutral Nation (because of their neutrality in the on-going disputes between the Iroquois Confederacy and the Huron), then by the Iroquois and later on, the Ojibway. It is likely that the lands now known as Churchill Park would have been dominated by an Oak Savannah ecosystem, consistent with the cultural characteristic of the Princess Point Complex. There is the possibility that Indigenous peoples may have used the land agriculturally, but this is only theorized (Churchill Park Management Plan, 2015). The archaeological layers have been disturbed due to decades of agricultural and development of the land, particularly clay extraction, but this does not discount the possibility for a few artifacts to be buried at deep levels of the soil profile. Archaeological site review at the outset of the project found no evidence of remaining material.

Throughout the 1800s, the site was used primarily for agriculture by the Buttrum family (Churchill Park Management Plan, 2015). In the early 1900s, brick making was the prime operation when the focus of the area shifted to extracting clay from the site.

The adjacent Westdale neighbourhood, was constructed in the 1920s. The development company aimed to create “an upscale Protestant environment” from what was currently being used as farmland. By 1927, 377 acres of land were sold to the City of Hamilton (as the site of the campus for McMaster University) and the first lands of RBG, which was largely Cootes Paradise and parts of the current existing Nature Sanctuary.

Along with the founding of RBG in 1941, Churchill Park was added to the Cootes Paradise Nature Reserve. The park, while owned by RBG, was maintained by the Hamilton Parks Board, with the exception of the Teaching Garden, RBGs original base of operation, which was maintained by RBG until 1996. The Teaching Garden, now known as the community gardens, has since been managed by the City of Hamilton under a lease agreement.

The greenhouses and ancillary buildings of the former Teaching Gardens which were constructed in 1948, are temporarily used to house exotic birds owned by the Friends of the Aviary. These birds were relocated from Dundurn Park Aviary in 1996.

Situated in a transition zone between the natural and urban environments, Churchill Park provides opportunity to serve as an ecological buffer to the abutting forest, act as a location for ecological stewardship from community members and promote public awareness and support for the ecological significance of Cootes Paradise Nature Sanctuary. Numerous efforts have been attempted by volunteers and City Staff to re-naturalize the forest edges throughout the 2000s using native plant species. In 2008, restoration plantings occurred on Earth Day behind the Teaching Garden and were hosted by RBG and Earth Day Hamilton. This was the beginning of the ecological transformation of Churchill Park over the next 15 years.

The adjacent Cootes Paradise Nature Sanctuary contains one of the few old growth forested areas within the Carolinian Forest in Southern Ontario. In addition to being an incredibly diverse ecosystem, the Cootes Paradise Nature Sanctuary provides habitat for many at-risk species with provincial and federal protection under the Endangered Species Act and Species at Risk Act, respectively.

Ecological Significance

Churchill Park abuts one of the most diverse and ecologically important nature sanctuary in southern Ontario, Cootes Paradise Nature Sanctuary, which spans over 600 hectares and features a 320-hectare river-mouth marsh, with 16 creeks and 25 kilometers of shoreline. Due to its location, nestled between Lake Ontario and the Niagara Escarpment, the Cootes Paradise Nature Sanctuary is an important stop-over for migratory birds. This prompted its designation as a formal wildlife sanctuary in 1927. Its location is also the reason for its unique and diverse flora community – Carolinian species in the uplands and more northern species in the spring-fed shady ravines. Home to many rare and at-risk species, the Cootes Paradise Nature Sanctuary is a highly studied and ecologically important piece of protected land in Southern Ontario.

The Cootes Paradise Nature Sanctuary can be divided by the marsh that runs through it, parceling two pieces of forest as nearly distinct ecological units – the North Shore is the larger section of the sanctuary, which is bordered by a more rural, agricultural setting, and the South Shore, which is a thin ribbon of land acting as a buffer between the marsh and the neighbouring urban environment. Therefore, due to its location and proximity to an urban environment, there is tremendous anthropogenic stress placed on the South Shore Forest.

The reforestation initiative along the edge of Churchill Park had many ecological goals, but one of the primary goals was to create a defined forest edge that was separated from the urban, city-run park. Principal threats prior to the completion of the reforestation project were the creation of unofficial and informal trails from the park edge (which acted as passive access to formalized trails on the South Shore), yard-waste dumping, the introduction and proliferation of non-native and invasive species, and off-leash dogs entering the forest and disturbing wildlife. These were key items that were addressed during the development of the Master Plan for Churchill Park.

Park Master Plan

The beginnings of the Master Planning process for Churchill Park began in July 2010, when the City of Hamilton announced the project on their website. In the winter of 2011, four supporting studies were conducted to support the planning process of the Master Plan. At that time, the overall vision and goal for the project was developed.

Vision

“Churchill Park is a unique, open, and strikingly beautiful space that embraces the natural heritage of Cootes Paradise. Central to the community, the park enhances the health and well-being of everyone in all seasons.” (Churchill Park Management Plan, 2015).

Goal

“Preserve our existing open space and encourage adaptable, inviting, safe, beautiful, and sustainable environment that reflects the community’s values, provides a community gathering space, and facilitates participation in activities for everyone.” (Churchill Park Management Plan, 2015).

Implementation Timeline and Phase Deliverables

Phase 1

The following deliverables were completed during Phase 1 of the Master Plan project at Churchill Park by September 2019:

1. Re-graded turf and constructed rain gardens for storm water management purposes and along Parkside Drive.
2. Created a granular pathway from the intersection of Devon Place and Parkside Drive to Marion Avenue.
3. Installation of pathway connecting the Aviary parking lot to the trailhead at Ravine Road Trail.
4. RBG undertook restoration plantings of native trees and shrubs to increase the ecological integrity and vigor of the forest edge.

Phase 2

After refinements from the original plan outlined in the Churchill Park Management Plan resulting from further grading and water infiltration studies, the following items were completed by November 2022:

1. Installation of 1.5m and 2.5m wide walkways on the upper plateau of the park, connecting to the walkways installed in Phase 1 of the project.
2. Re-graded the existing cricket pitch to a multi-use field.
3. Installation of swales and small-scale rain gardens around the new multi-purpose field.
4. Shifted two mini soccer fields east for the installation of small rain gardens to improve drainage of the fields.
5. New and formal connections to RBG's existing nature trail network (Ginger Valley Trail and Princess Point Trail).
6. Installation of large stone seating zones at the Franklin Avenue and Norwood Road walkway entrances.

Phase 3

The implementation of Phase 3 has not yet taken place, but the public consultation occurred in November 2023. The goals for Phase 3 included:

1. Walkway leading from the corner of Marion Avenue and Cline Avenue to the trailhead at Ravine Road Trail.
2. Asphalt walkway connection from Cline Ave to the playground.
3. Development of an informal teaching zone between Temple Anshe Sholom and the playground.
4. Asphalt walkway from Cootes Paradise Elementary School to the playground.
5. Accessibility improvements to the Field House/washroom building.
6. Development of stairs and extension of existing sidewalk at Kipling Road and Parkside Drive.

Restoration History

Since 2009, stopping forest decline as well as increasing interior forest habitat within the 90ha 2.5km long South Shore Forest has been the driving goal behind RBG's reforestation plantings at Churchill

Park. The long narrow forest contained essentially no interior forest area due to edge fragmentation and is in decline (Barr et al. 2022; Vincent 2018). Therefore, by increasing the edge of the forest and infilling fragmentation as outlined in the Churchill Park Master Plan, the interior forest habitat on the South Shore will increase from essentially zero to 3 hectares (see Appendix 1 and Figure 2).

Figure 1. Reforestation sites along the edge of Churchill Park (Hamilton, Ontario) with associated planting and re-planting dates. Hatching across planting zones indicates the area has been planted more than once.

For each project area, site preparation took place before planting occurred. Site preparation projects were completed by RBG ecologists and biotechnicians. This process involved tasks such as invasive species management, pit and mound creation in three planting areas, addition of large pieces of woody debris, and exterior (park-side) fence installation. Basic planting designed incorporated a long list of common local native forest species but focused on Gray Dogwood (*Cornus racemosa*) as the primary boundary edging plant for the transition from park to forest. Gray Dogwood is most appropriate to clay soil, as well as spreads by runner forming an edge thicket.

A vital aspect of the reforestation plantings that have occurred over the last 13 years has been the involvement of RBG and community volunteers. Without continued assistance from volunteers, this work would have been extremely challenging due to staffing limitations. Volunteers have dedicated thousands of hours to reforesting the edge of Churchill Park, and RBG is thankful for their help over the

years. A breakdown of the number of trees and shrubs added to each site and volunteer hours committed to Churchill Park from 2021 until 2023 can be found in Appendix 3 and 4.

Planting History

Outlined below are the restoration details for each restorative project year. Some years involved both spring and fall plantings.

2009

The beginnings of forest restoration began in 2009 behind the Aviary at Churchill Park. The volunteer planting events took place in partnership with Earth Day Hamilton - Burlington during the month of April. In total, 1,000 trees and shrubs were added to the site. 16 species of native trees and shrubs were added to the landscape.

2010

With a similar structure to 2009, the 2010 Earth Day planting event took place behind the Aviary at Churchill Park in collaboration with Earth Day Hamilton – Burlington with 1,000 native trees and shrubs planted in April. However, Culbert (2014) noted that the plantings from 2009, 2010, and 2011 had very low survival rates (with a combined 3% survival rate). Of the 2,000 trees and shrubs that were planted at the site in 2009 and 2010, only 58 were located and recorded as alive in 2011. Of the 58 species, 8 species of trees and shrubs were found – American Beech (*Fagus grandifolia*) was the most common species still living, followed by White Ash (*Fraxinus americana*), White Birch (*Betula papyrifera*), Black Cherry (*Prunus serotina*), White Pine (*Pinus strobus*), White Oak (*Quercus alba*), Chokecherry (*Prunus virginiana*), and Dogwood (*Cornus sp.).*

2011 - 2012

The 2011 Earth Day planting event took place on the south side of the Ravine Road trailhead and continued west and curved around the back of the Teaching Garden, once again, with Earth Day Hamilton-Burlington. 15 species of native trees and shrubs were planted. Community volunteers and RBG volunteers helped plant 948 trees and shrubs during the month of April. Unfortunately, due to a communications error, the City of Hamilton mowed the majority of the planted trees this year. The city replanted them, but the survival rate was very low.

Volunteers tree planting, 2011.

In 2012, 110 additional native trees and shrubs were added to the 2011 planting area. Note that this year was the year the nearby Bond St. field was planted in association with a Butternut Tree compensation and protection project. Multiple of the sections of the reforestation area contain Butternut trees as part of this overall compensation project.

2015

In 2015, following the approval of the park masterplan, a total of 1,159 trees and shrubs were planted along the southwest edge of Churchill Park and the Ravine Rd Trail Entrance over the course of two planting events (one in the spring with Earth Day Hamilton Burlington and the other in the fall). 37 species were added to this site, 23 tree species and 14 shrub species. This area was cleared of Buckthorn prior to planting. Trees planted on the east side of the trail entrance were protected with deer fence around the perimeter.

Tree planting event, 2015.

Tree planting event, 2015.

2016

A new section of restoration began just northwest of the 2015 site and continued the extension of the restored edge at Churchill Park. 607 shrubs and 53 trees, accounting for 29 species, were planted in this area with the help of Earth Day Hamilton-Burlington.

Trees successfully planted, 2016.

Tree planting event, 2016.

2017

The 2017 planting area is nestled between the forest edge and an area that was formerly a soccer field, which was then reforested in 2020. In total, 138 trees and 679 shrubs were planted in this space. Tall black deer fencing protected the majority of the plants, and the remaining trees outside of the enclosure received individual metal fencing.

Assistant Ecologist, Felicia Radassao, providing event details to volunteers, 2017.

2018

A large project was undertaken in April 2018; the goal was to once again re-forest the parcel of land that abuts the Aviary. This area was previously planted in 2009 and 2010, but due to lack of exclusion fencing to prevent White-tailed Deer from damaging the plants, the previous plantings were highly unsuccessful. Therefore, in 2018, the shrub border was fenced in an effort to deter deer from over-browsing the plants, along with the installation of small shrub and tree “islands” throughout the planting area. However, not all the 734 trees and shrubs received protective fencing due to lack of available materials and funds. This was the last event where volunteers from Earth Day Hamilton-Burlington were used.

Earth Day tree planting event at the Aviary, 2018.

2019

The location of the 2019 Earth Day planting was at the very north end of Churchill Park. Prior to planting, a former utility building was removed from the site. A chilly and rainy Saturday set the stage for the Earth Day planting that occurred the Saturday of the Easter weekend.

In total, RBG volunteers and community volunteers planted 682 trees and shrubs in the parcel of restoration land at the north end of the park. Aftercare involved installing tall black deer exclusion fencing around the perimeter of the restoration site and installing rodent guards on large trees.

In the fall of 2019, site preparation began in the former soccer field around the center of the park to be planted in 2020. The perimeter was identified (fence posts installed) and pits and mounds were installed throughout the field, including a larger and deeper section near the back of the field by the forest edge to accommodate longer water retention for amphibians. The turf grass was also treated with 1 round of herbicide application (Round-Up).

Cheerful volunteers, despite the rain!

Trees and shrubs ready to be planted.

Biotechnicians assisting with the development of pits and mounds for a new restoration site, 2019.

2020 and 2021

2020's Earth Day planting project at Churchill Park was one of the most ambitious yet, measuring 0.78 hectares of reforestation area (Appendix 1). Due to the onset of the COVID-19 pandemic, the planned spring plantings in 2020 were delayed until October. However, to signify the beginning of the restoration work at this site, RBG staff planted 16 caliper-sized bareroot trees and seeded the field with a variety of native wildflower species such as Black-eyed Susan, False Sunflower and Wild Bergamot during the spring planting season.

Native seed mix for the pit and mound restoration site.

Volunteers planting shrubs, 2020.

When restrictions were lifted, RBG held several small-scale planting events at a former soccer field over the course of the fall of 2020 and spring of 2021. Over the course of the prolonged planting strategy, 1,668 shrubs and trees were planted in the former soccer field. The new reforestation area for 2021 was slightly north of the large, former soccer field. The primary goal for the newly delineated 2021 planting zone was to extend the existing forest edge and create a robust barrier for the South Shore Forest. In total, 67 trees and 1178 shrubs were planted along the forest edge. A total of 19 species were added to this site.

During the fall planting season, 99 trees were added to the 2016 planting area due to low survival rates of trees planted 5 years prior. The 99 trees consisted of 12 species that had survived the 2016 planting.

Despite pandemic lockdowns, RBG volunteers helped staff plant trees and shrubs, 2021.

Former soccer field transformed into a pit and mound restoration site, with native trees, shrubs, and wildflowers, 2021.

Every tree and shrub planted during these two years received either tall black fencing or individual metal fencing to protect the plants from deer browse and buck rub.

Metal fencing around each planted tree stops deer from browsing and rubbing their antlers on the trees.

2022

Spring planting events in 2022 consisted of re-planting the shrub border along the edge of the 2015 (fall) and 2016 planting sites due to the small survival rate from initial plantings. The existing tall black fencing was removed to prepare the site for planting, and re-installed once the shrubs were in the ground.1,276 shrubs of 9 species were planted by RBG volunteers and the Rotary Club of Burlington.

From July until November 2022, Phase 2 construction began at the north end of Churchill Park. Drainage and rain garden features were installed to assist with drainage during wet seasons.

For four months in 2022, much of the north end of Churchill Park was under construction to address on-going drainage

The Rotary Club of Burlington assisted with shrub planting in a previously planted area, 2022.

Post-construction at the north end of Churchill Park.

2023

In February and March 2023, RBG's biotechnicians installed and re-aligned fencing at the north end of Churchill Park and along the western edge of the park. Before planting began, sod that was laid down post construction had to be removed from the planting areas. Due to the wet conditions of the site, machinery could not be used. Volunteers helped staff remove sections of sod which was laborious but necessary.

Removing turfgrass, 2023.

Volunteers planting shrubs, 2023.

2023 marked the final year of continuing new planting areas along the edge of Churchill Park. The 2019 planting area required re-planting, and due to construction in the north end of the park in mid to late 2022, fence re-alignment was required. Therefore, the total area of the 2019 planting area increased slightly. 871 shrubs and 113 trees were planted in the former 2019 area, as well as a newly delineated reforestation site just outside of the former entrance to the Ginger Valley Trail. In total 31 species of native trees and shrubs were added to the site. All trees in the 2019 planting area and the newly defined 2023 planting area received proper fencing to aid in their survival. Native wildflower seed was also added to the areas where sod had been removed.

Aftercare of planting sites includes watering recently planted trees and shrubs during droughts, 2023.

In addition to the plants, the site received assistance in helping water productively pool during the wet seasons. At the northeast corner of the park, a small rain garden was dug alongside the entrance to the Princess Point Trail to assist with water re-direction and to act as a demonstration rain garden for trail and park users. Swamp Milkweed and Red Osier Dogwood plugs were added to the

rain garden. Throughout the entirety of the summer and fall months, the rain garden held water and a few species of amphibians were observed using this newly created feature.

Staff planting shrubs, 2023.

The fall planting of 2023 consisted of completing the small, final parcel of restoration area slightly south of the spring's planting site. 140 trees and 1,314 shrubs were added to complete this area, comprising of 35 native species. In addition to the planting, RBG's biotechnicians constructed three shallow depressions (ponds) to direct water to pool in predetermined areas. Due to a wet fall and early winter season, the rain gardens were over-flowing with accumulated water. Adjustments to the ponds may be needed in the future (i.e., extracting more soil to increase their depths). The completion of this parcel signified the end of more than a decade of transformation along the edge of Churchill Park. The entire western and northern edge of the park area is now lined with reforestation plantings and a continuous metal fence, clearly delineating "urban park" versus "nature sanctuary".

Site Protection and Maintenance

Fencing

RBG staff and volunteers have spent hundreds of hours installing protective fencing around the restoration sites at Churchill Park. Two distinct types of fencing have been undertaken, including a boundary fence and restoration plantings protection fence. Along the boundary between the reforestation and the park perimeter trail 1.15 km of metal fence has been installed – farm fence (cedar posts and wire), by RBG's biotechnicians. RBG ecologists installed a secondary layer (matching the length of the exterior metal fence) of 2.5m tall black deer exclusion fencing, which then protected the shrub border (between the metal and black fencing). Additionally, each planted tree received a piece of metal fence to protect it from White-tailed Deer bucks from rubbing their antlers against the trunk of the tree. The total length of fence type and number of t-bars required for installation since 2020 can be found in Appendix 2.

Volunteers assist staff with plant protection temporary fence installation.

Due to the expanse of fence installed throughout the restoration areas surrounding Churchill Park, occasional and seasonal maintenance will be required. Not only for park user aesthetics, but also for practical purposes, the shrub border fencing and metal tree fence will need to be upkept by RBG staff and volunteers.

As the plants grow to a size where they can withstand browse and/or buck rub, consideration for fence removal will be done on an as-needed basis. In the fall of 2023, RBG staff conducted the first removal of metal fencing around trees in a reforestation site that were planted 10 years ago. Continued monitoring of these recently released trees will be used to develop a protocol for fence removal at Churchill Park.

Post and Wire Farm Fence creates a physical boundary between city park and nature sanctuary, 2023.

Invasive Species Management

Despite efforts to eradicate various invasive species prior to restoration plantings took place, there is still need for continued maintenance and removal of invasive plant species – particularly Kentucky Blue Grass, Common Burdock, Dog-strangling Vine, Common Buckthorn, non-native Honeysuckle species, European Alder, Eastern Red-bud, Multiflora Rose, Lesser Celandine, Bull Thistle and Canada Thistle. RBG's Terrestrial Ecologists have been removing Burdock, Common Buckthorn, non-native Honeysuckle, and Dog-strangling Vine from the edge of Churchill Park for many years. Progress has

been made in depleting the populations, but continued manual and chemical treatments will be required in the future to keep the number of invasive species low or non-existent.

The proximity of Churchill Park to urban backyards puts it at risk for garden escapees. Lesser Celandine is a relatively newer threat to the ecological integrity of the restoration sites. This mat-forming, aggressive horticultural escapee has the potential to overtake restoration sites at Churchill Park and the surrounding forest if no management efforts are undertaken. Lesser Celandine is a particular threat in the northeast section of restoration plantings at Churchill, with the plant spreading further into the restoration site each spring. RBG ecologists should continue to monitor the population and intervene with either mechanical or chemical treatment to prevent further spread.

Despite being the edge of a nature sanctuary, nearby residents often dump yard waste into the restoration areas that line Churchill Park. This has resulted in the introduction and proliferation of various invasive species to the edge of the forest – such as a species of Lungwort (*Pulmonaria sp.*). First noted in 2021 along the edge of Churchill, RBG have noted spread of this low-growing herbaceous horticultural genus ever since.

Re-Plantings

Once a planting is completed, it is not expected that there will be a 100% survival rate. The factors that increase survival rate are deer exclusion fencing, watering during droughts for the first two to three years after planting, and removal of invasive species (both plant and animal). The low survival rate found by Culbert (2014) assisted in guiding the protocols for tree and shrub protection after planting. Despite the aftercare protocols, there is always expected death in restoration plantings. Anecdotally, RBG staff have noted and deemed a planting successful if the survival rate is between 60% and 70%. However, this is not always the outcome, due to various factors such as poorly planted trees by inexperienced volunteers or environmental stressors (drought, defoliation due to Spongy Moth, flooding etc.).

Volunteers are essential in successful restoration projects.

Two places where RBG ecologists have re-planted trees and shrubs are the restoration site behind the Aviary (re-planted in 2018) and the 2015 and 2016 planting sites (re-planted in 2021 and 2022). Planting sites need continuous monitoring and efforts to re-plant are needed when there is less than 50% survival rate in historical plantings. It is recommended that RBG ecologists develop a rotating 5-year monitoring plan for parcels of restoration sites along the edge of Churchill Park to ensure that sites are monitored, and re-planting is conducted when necessary.

Site Management Plan

It is recommended that each planting site receive its own management plan to identify necessary tasks required to keep the restoration site ecologically intact. Items and tasks to note during inventory and site visits include, but are not limited to:

- Fencing repairs and removals
- Invasive species management needs
    - Spongy Moth defoliation impacts during outbreaks need to be prevented.
    - Continued control of invasive plants in reforestation areas (e.g., Burdock, Dog-strangling Vine, Manitoba Maple, English Oak, Canada Thistle, Lesser Celandine, Common Buckthorn, invasive Honeysuckles, Eastern Redbud, European Alder, etc.)
- Potential for seed collection opportunities
- Approximate percent survival rate of trees and shrubs
- Closure of unofficial trails through restoration site
- Water pooling and drainage solutions (i.e., the construction of ephemeral ponds in areas that experience seasonal flooding)

The Site Management Plan should outline site needs, required equipment, timeline for necessary tasks, and recommend a deadline for secondary assessments. It would be ideal for the Management Plan to be completed in late winter or early spring, to allow staff to prioritize and identify dates throughout the growing season that work best for each task type.

Future issues to address post-planting include challenges with water and drainage, where fine tuning along the path will be needed.

References and Further Reading

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Appendix

Appendix 1

Table 1. Approximate area of planting sites with associated years when planting events occurred.

Date(s) Planted	Area (ha)
2009 / 2010 / 2018	0.97
2011	0.55
2015 / 2022	0.14
2016 / 2022	0.08
2017	0.14
2020	0.78
2021	0.10
2019 / 2023	0.16
2023	0.07
	Total = 2.99 hectares

Appendix 2

Table 2. Materials required for fencing and tree and shrub protection at Churchill Park since 2020.

		Year Purchased				
		2020	**2021**	**2022**	**2023**	**Grand Total**
Materials Required	6ft T-bars	150	225	75	250	**700**
	7ft T-bars	210	250	160	440	**1,060**
	Black Deer Fence (2.5m tall, 100m rolls)	2	3	2	4	**11**
	Cedar Posts	46	36	0	75	**157**
	Protective Metal Tree Fence (100m rolls)	3	10	9	18	**40**
	Exterior Metal Fence (100m rolls)	2	2	0	2	**6**
	Grand Total	**415**	**529**	**249**	**796**	**1,989**

Appendix 3

Table 3. Volunteer hours contributed to various tasks at Churchill Park since 2021.

Task	**Year**			
	2021	**2022**	**2023**	**Total Hours per Task**
Fencing	18		32	50
Invasive Species Removal	21	34	33	88
Planting	118.5	99.5		218
Tree Planting			220.5	220.5
Site Preparation	7.5		40.5	48
Watering Plants	12			12
Total Hours per Year	**177**	**133.5**	**326**	**636.5**

Appendix 4

Table 4. Number of each species planted along the edge of Churchill Park over planting years.

Species Planted	2010	2011	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Planted
Alternate-leaved Dogwood	x	x		x	x	x					x	x	**375**
American Beech									x				**5**
American Elm							x	x	x	x		x	**64**
American Hazelnut							x		x	x	x	x	**170**
American Plum				x					x	x	x	x	**33**
Basswood	x		x	x	x	x	x	x	x	x		x	**154**
Bitternut Hickory				x	x	x			x	x		x	**52**
Black Cherry	x		x	x	x	x	x	x	x	x		x	**184**
Black Maple				x									**5**
Black Oak					x	x							**4**
Black Raspberry					x	x		x	x	x	x	x	**940**
Black Walnut							x		x	x			**30**
Bur Oak				x	x				x			x	**42**
Bush Honeysuckle				x									**5**
Butternut									x				**10**
Carolina Rose				x									**30**
Choke Cherry	x		x	x	x	x	x	x	x	x	x	x	**705**
Common Blackberry				x				x	x	x	x		**920**
Dotted Hawthorn									x			x	**34**
Downy Serviceberry								x					**20**
Eastern Cottonwood				x									**25**
Gray Dogwood		x	x	x	x	x	x	x	x	x	x	x	**3,826**
Honey Locust												x	**5**
Ironwood			x	x		x	x		x			x	**42**
Kentucky Coffeetree										x		x	**4**

Species Planted	2010	2011	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Planted
Large-tooth Aspen				x	x	x	x					x	**64**
Mapleleaf Viburnum			x									x	**30**
Musclewood						x	x		x	x		x	**32**
Nannyberry	x	x	x	x	x	x	x	x	x	x		x	**373**
Pasture Rose					x								**25**
Pignut Hickory				x									**6**
Pin Oak					x	x							**12**
Prickly Gooseberry						x							**50**
Purple-flowering Raspberry		x	x	x	x	x	x	x	x			x	**285**
Red Elderberry			x	x	x	x	x						**70**
Red Maple			x	x	x	x	x		x	x		x	**83**
Red Oak				x	x	x	x	x	x	x	x	x	**101**
Red Raspberry		x											**50**
Sassafras			x	x	x								**9**
Shagbark Hickory			x	x	x	x			x	x		x	**49**
Silky Dogwood				x								x	**31**
Silver Maple				x									**2**
Smooth Rose									x	x	x	x	**630**
Smooth Serviceberry		x	x	x	x	x	x	x	x	x	x	x	**93**
Staghorn Sumac	x			x	x	x	x					x	**286**
Sugar Maple				x	x	x	x	x	x	x		x	**77**
Swamp Rose				x									**5**
Swamp White Oak				x					x				**15**
Sycamore				x	x							x	**12**
Trembling Aspen	x			x	x	x	x	x	x	x		x	**199**
Tulip Tree			x	x	x	x	x		x	x	x		**85**
Virginia Creeper			x										**15**
White Birch	x			x	x	x	x	x	x	x	x	x	**251**

Species Planted	2010	2011	2012	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Planted
White Cedar							x					x	**13**
White Oak	x			x	x	x	x	x	x	x	x	x	**129**
White Pine	x		x	x	x	x	x	x	x	x	x	x	**108**
Witch Hazel	x		x	x	x	x	x	x	x	x			**317**
Red Osier Dogwood												x	**30**
White Ash	x												**20**
Total Trees and Shrubs Planted Each Year	**1,000**	**322**	**110**	**1,159**	**660**	**817**	**734**	**682**	**1,668**	**1,350**	**1,285**	**1,454**	**11,241**
Number of Species	12	6	17	37	29	28	25	18	32	26	14	35	
Number of Tree Species	7	1	9	23	19	18	17	11	22	17	6	22	
Number of Shrub Species	5	5	7	14	10	10	8	7	10	9	8	13	


Caleb's Walk Trail
Proposed expansion of forest edge
Existing parking
Proposed rain garden
Oak Knoll Rd
Existing trees in RBG arboretum to remain
• interplant with new trees to support arboretum concept
Potential walkway gated entry to remain
Existing Churchill Community Gardens to remain
• allotment gardens / teaching gardens
• improvements to be determined in consultation with user groups
Proposed rain garden
Regrade and resurface access to RBG trails
Dromore Cres
Create entrance, information and seating node for trail entrance
Westdale Ravine Trail
Proposed 2.5m wide granular surface walkway
Marion Ave N
Improve entrance area and shelters
Proposed rain garden to address drainage issues
Gateway entrance
Park entrance sign
Former lawn bowling
• maintain and upgrade lawns for mini soccer and skating
Maintain existing clubhouse
• summer community use
• winter support for skating
• upgrade landscaping and walkways
Existing baseball diamonds to remain
Proposed climbing structure for older children
Shade structure and picnic area
Proposed shade structure for water play area
Improved, consolidated storage/ mechanical support
Retain/ repair existing fence (extend/ add to north side)
Cline Ave N
Temple Anshe Sholom
Proposed 2.5m granular walkway
Proposed informal teaching area
Parkside Dr PROJECT BOUNDARY
Existing play structure, swings, and splash pad to remain
Park entrance sign
George Allan School
Glen Rd
Devon Pl
Existing field house to remain and interior and landscaping to be upgraded
Accessible route
Kipling Rd
Proposed multi-use sports fields
Existing junior soccer and multi-use fields
Existing senior soccer and multi-use field
Existing cricket pitch and ultimate frisbee field (future multi-use open space and frisbee field)
Proposed reforestation of existing soccer field
Proposed 1.5m granular walkway along forest edge
PROJECT BOUNDARY
Proposed expansion of forest edge
Ginger Valley Trail
Trailhead
• seating
• signage
Parkview Dr
Proposed 2.5m granular walkway
Princess Point Trail
Norwood Rd
Uplands Ave
Franklin Ave
Parkview Dr
Legend
Existing Vegetation
Existing Forested Edge
Proposed Reforestation Areas
Existing Tree
Proposed Tree
Existing Trail
Proposed Granular Walkway
Proposed Rain Garden
Existing and Proposed Benches & Picnic Tables
Key Plan
Cootes Paradise
Churchill Park
Cootes Paradise
N
Hamilton
Landscape Architectural Services
DILLON CONSULTING
Churchill Park Master Plan
Scale
March, 2 2013